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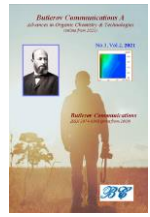

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Evaluation of chloride corrosion in the survey of a reinforced concrete structure in Nha Trang Bay (Vietnam)

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Abstract

In recent years, Vietnam has been paying great attention to the development of the port infrastructure in coastal regions. Many reinforced concrete structures are being built, but the environment aggressiveness leads to a premature deterioration of their performance characteristics. Among the corrosion processes of reinforced concrete structures, the most common is the corrosion of reinforcement in concrete under action of chlorides. The purpose of this work is to assess chloride corrosion when examining the reinforced concrete berth structure in Nha Trang Bay (Vietnam). To analyze the reinforced concrete structure, concrete samples were taken at various depths from the berth surface in the above-water zone and in the zone of variable water level. It is shown that the content of chloride ions in all the samples under study exceeds the critical value. In the zone of variable level, chlorides penetrate into concrete faster than in the above-water zone due to alternating wetting and drying, which contribute to the advancement of the front of chloride penetration. With an increase in sampling depth, the difference in the chloride content in the two zones decreases. Analysis of water extracts from the samples showed that when approaching the armature, the pH value of the samples increases. In this work, to assess the effect of chlorides on the corrosion of steel in concrete, the ratio of chloride concentration to the concentration of OH^- ions in concrete samples was also used. It is shown that only at the depth of armature of the above-water zone this ratio remains less than the maximum allowable content. At the same depth of the zone of variable water level, the $[Cl^-]/[OH^-]$ ratio is twice as high as the maximum allowable content. It was found that to assess the effect of chlorides on reinforced concrete structures, the ratio of chloride concentration to the concentration of OH^- ions

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in the reinforcing concrete layer characterizes the corrosion state of reinforcement more accurately than the chloride content. The obtained results of visual examination and laboratory measurements show a fairly good convergence.

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